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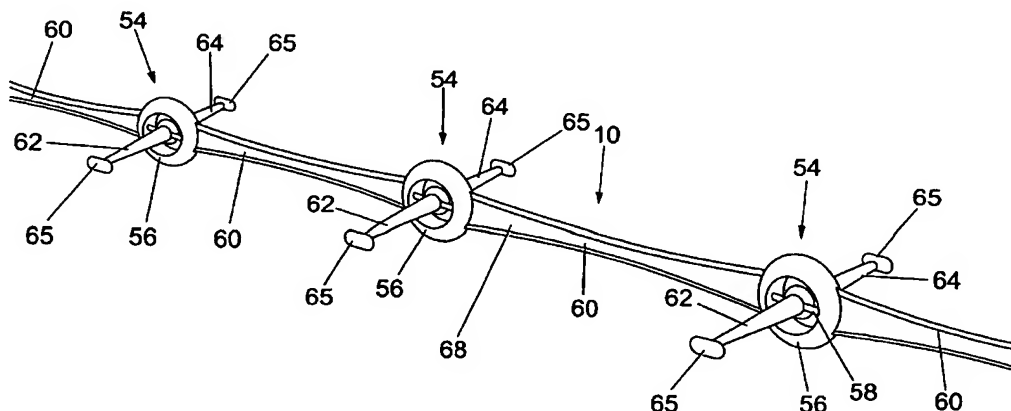
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(54) Title: RESTRAINING APPARATUS



(57) Abstract: Restraining apparatus for coupling together two or more users such as children while walking as a group. The apparatus comprises a spine member with lateral attachment arms for coupling the users to the spine member. The spine member is laterally flexible to allow the spine to bend from side to side when corners are being negotiated in use, but has sufficient stiffness in the vertical plane to resist sagging between the users.

13 MAR 2005

RESTRAINING APPARATUS

This invention relates to restraining apparatus, and especially but not exclusively, to apparatus for securing children.

It is often difficult to control a group of children and to keep them safe in the group, particularly when taking them for walks or excursions.

According to the present invention there is provided restraining apparatus for coupling two or more users comprising at least one spine member with at least two lateral attachment members for coupling the users to the spine member, the spine member having two planes, and having more flexibility in one plane than in the other.

The spine member can be an elongate rod or plate from which the lateral attachment members extend sideways. The rod or plate is typically inextensible along its long axis and is preferably

1 rigid in its vertical plane but preferably has some
2 lateral resilience, so that it can bend sideways in
3 its horizontal plane with the movement of the users.
4 Lateral resilience in the horizontal plane in use of
5 the device is preferable to lateral resilience in
6 the vertical planes because rigidity in the vertical
7 plane with respect to the user has the benefit that
8 parts of the spine member have a reduced tendency to
9 sag and become trampled underfoot. Therefore,
10 preferred embodiments of the device can bend
11 laterally from side to side in the horizontal plane
12 of the device, but not up and down in the vertical
13 plane of the device.

14

15 In some embodiments the spine member is axially
16 compressible and/or extensible. Plastics material
17 is suitable for the spine members. Optionally, at
18 least a part of the spine member is made of
19 corrugated plastic. Alternatively, the spine member
20 is made of composite plastics material or rubber.
21 The spine may have a stiffening metal member such as
22 a plastics, metal or composite plate covered with
23 the plastics or rubber material.

24

25 The spine being flexible and/or compressible allows
26 the users to approach each other and to turn
27 corners.

28

29 Preferably, the attachment members are securely
30 attached, but in a releasable manner and are
31 typically coupled to the spine member at nodes on

1 the spine member. Preferably, each node has two
2 attachment members.

3
4 The attachment members are typically arms. The arms
5 may be laterally flexible and/or axially extensible
6 and/or compressible, to absorb sudden forces. In
7 some embodiments they can be rigid or semi-rigid, or
8 preferably non-flexible in some planes but flexible
9 in others.

10
11 Typically, the attachment members are pivotable with
12 respect to the spine member. Optionally, each
13 attachment member at each node is pivotable with
14 respect to the other attachment member. In
15 preferred embodiments, each node has a pair of
16 attachment members extending laterally from opposite
17 sides of the spine member. It is not necessary to
18 have an attachment member extending from each side
19 of each node; a single node can instead bear a
20 single attachment member. Attachment members can
21 all extend from the same side of the spine member,
22 or from different sides. In one optional
23 embodiment, members are staggered along the spine
24 member.

25
26 Pivotal attachment members allow users of different
27 heights to share one node.

28
29 Optionally, two or more spine members are connected
30 together.

31

1 This allows a long chain of spine members and nodes
2 to be built up, which is useful to connect a large
3 number of users.

4
5 Preferably, the apparatus also includes harnesses to
6 be worn by each user. Typically, each harness is
7 adapted to releasably engage an attachment member,
8 to attach the user to the spine member. Typically,
9 the harness includes a belt. Optionally, the
10 harness includes a shoulder strap, but simple waist
11 belts would suffice. Preferably, each harness has
12 at least one socket to engage a protrusion on an
13 attachment member, but other attachment formations
14 can be used instead. Optionally, the socket
15 includes a first plate, biased apart from and
16 pivotable relative to a second plate, and pivoting
17 moves the ends of the plates at the socket mouth
18 apart to enlarge the mouth to engage/release an
19 attachment member. Typically, the plates are biased
20 apart by a coil spring. Typically, both plates are
21 pivotable with respect to the socket. Another
22 alternative attachment system could involve moulded
23 plastic ball-joints and sockets, clips, buckles, or
24 other similar connectors that are commercially
25 available.

26
27 In another aspect the invention provides a method of
28 securing or restraining a person, comprising
29 harnessing the person to a spine member via an
30 attachment member, the spine member having at least
31 two planes, and having a different degree of
32 flexibility in respective planes.

1 Typically more than one person is harnessed to the
2 spine member.

3
4 In some embodiments the spine and/or the harness can
5 be coloured brightly, and/or can incorporate
6 luminous, reflective and/or light emitting devices
7 such as LEDs and strobes to attract attention.

8
9 An embodiment of the present invention will now be
10 described by way of example only and with reference
11 to the following drawings, in which:-

12
13 Fig 1 is a plan view of six children using a
14 restraining apparatus;
15 Fig 2 is a plan view with the children with the
16 apparatus in a compressed position;
17 Fig 3 is a plan view of the children in a
18 curved configuration;
19 Fig 4 is a front view of a harness worn by each
20 child;
21 Fig 5 is a front view of the apparatus worn by
22 two children of different heights;
23 Fig 6 is a perspective view of one embodiment
24 of the apparatus;
25 Fig 7 is a perspective view of an alternative
26 embodiment of the apparatus;
27 Fig 8 is a perspective view of an alternative
28 embodiment of the apparatus;
29 Fig 9 is a perspective view with interior
30 detail of part of the apparatus, showing an arm
31 located in a socket;

1 Fig 10 is a side view with interior detail of
2 the arm and socket of Fig 9;

3 Fig 11 is an exploded view of a node, spine
4 members and attachment means;

5 Fig 12 is a perspective view of the apparatus
6 of Fig 11 with the node secured to the spine
7 members;

8 Fig 13 is an exploded view of a node of the
9 apparatus, spine members and an alternative
10 attachment means;

11 Fig 14 is a perspective view of the apparatus
12 of Fig 13 with the node secured to the spine
13 members; and

14 Fig 15 is a schematic view of different
15 embodiments of the apparatus.

16

17 Fig 1 shows six children 12 secured together by
18 restraining apparatus 10. The apparatus 10 has two
19 elongate spine members 14, 16. Each node 18, 20, 22
20 has two lateral arms 24, 26; 28, 30; and 32, 34.

21

22 The spine members 14, 16 are optionally axially
23 compressible and/or extensible and/or laterally
24 flexible in the horizontal plane of the apparatus in
25 use, to allow the apparatus to bend. This allows
26 the children 12 to approach each other (fig 2) and
27 turn corners (fig 3). However, the spine members
28 14, 16 are normally inextensible, or at least only
29 very slightly axially resilient, so that the
30 distance between the children cannot increase to any
31 great extent. Also, the spine members are typically
32 comparatively more rigid in the vertical plane than

1 in the horizontal plane, so that the spine does not
2 sag between nodes.

3
4 Different sizes of apparatus 10 are envisaged,
5 depending on the number of children to be secured.
6 To make a larger version of apparatus 10, additional
7 spine members and nodes can simply be attached to
8 the apparatus 10.

9
10 Fig 4 shows a harness 36 that is used to attach the
11 children 12 to the apparatus 10. The harness 36 has
12 a shoulder strap 38 and a belt 40. The belt 40 is
13 fastened by a simple buckle 42. The belt 40 also
14 has two sockets 44 for engagement with an arm of the
15 apparatus 10. Sockets 44 can optionally slide on
16 rails 46 provided in the belt, so that the child can
17 turn sideways with respect to the spine 14, 16. The
18 sockets 44 can typically be switched between a first
19 configuration where they are fixed immovably to the
20 rails 46, and a second configuration in which they
21 can slide relative to the rails 46.

22
23 Fig 5 shows two different-sized children 12 secured
24 to node 22 by arms 32, 34. Each user 12 is wearing
25 a harness 36, and a socket 44 in each harness 36 is
26 engaged with an arm 32, 34 of the node 22. The arms
27 32, 34 are pivotable with respect to the node 22, to
28 allow the different-sized children 12 to be
29 connected to the apparatus 10 without twisting the
30 apparatus 10.

31

1 The arms 32, 34 can also be axially and laterally
2 resilient so as to resist the transfer of forces
3 between the children connected to the node 22.

4

5 Fig 6 shows an embodiment of apparatus 10, having
6 spine members 60 connected to each other by single
7 pivot nodes 54. The spine members typically
8 comprise an elongate strip covered with a non-pvc
9 rubber. The spine members 60 can typically comprise
10 thin sheets of plastic, metal or composite material
11 (such as GRP or carbon fibre), orientated so that in
12 use the sheets lie in the vertical plane. This
13 allows lateral but not vertical flexibility of the
14 spine members.

15

16 In this embodiment, each node 54 comprises a ring 56
17 and a rod 58, which passes through the centre of the
18 ring 56 in a direction parallel to the axis of the
19 spine members 60. Each pair of arms 62, 64 is
20 typically formed as a single piece, having a central
21 bore arranged parallel to the axis of the spine
22 members 60 and shaped to accommodate the rod 58,
23 which passes through the bore. Each pair of arms
24 62, 64 is pivotal around the rod 58 and is thus
25 pivotable with respect to the spine members 60, but
26 the arms 62, 64 are not pivotable with respect to
27 each other. The ends of arms 62, 64 have elongate
28 tabs 65 to engage in the sockets of the harness.
29 Spine members 60 optionally have reflectors 68,
30 which help the children 12 to be seen in the dark.

31

1 Fig 7 shows an embodiment very similar to that of
2 Fig 6, except that the rings 56 of each node 54 are
3 closed or covered, typically by a rubber or plastics
4 gaiter. This could help prevent fingers from
5 becoming trapped in the nodes 54. In this
6 embodiment the arms 62, 64 could be pivotable
7 independently of one another.

8
9 Fig 8 shows an alternative embodiment of apparatus
10 110, having a number of spine members 160, each of
11 which includes a portion of corrugated plastic
12 tubing. The corrugated tubing allows the spine
13 members 160 to bend laterally and to be compressed
14 and stretched axially. The other major difference
15 from the previous embodiment is that the arms 162,
16 164 are pivotable relative to each other, as well as
17 relative to nodes 154. The arms 162, 164 are also
18 typically resilient and can be formed from a rubber
19 material. These arms could of course be used with
20 the earlier embodiments.

21
22 Figs 9 and 10 show views of arm 62 engaged in socket
23 44. Inside socket 44 is a grip device 90, which
24 includes two plates 92, 94, each having an aperture
25 to receive opposite ends of elongate tab 65 on the
26 end of the arm 62. The plates 92, 94 are pivotable
27 about respective pivot points 96, 98 and a coil
28 spring 93 held in compression between the plates on
29 one side of the pivot points 96, 98 at the end
30 furthest from the socket mouth urges the other ends
31 of the plates together to capture the tab 65 in the

1 apertures. Dual buttons 95, 97 are connected to the
2 plate ends above and below the spring 93.

3
4 The dual buttons enable release from the apparatus.

5
6 Simpler connectors are possible, along the lines of
7 buckles or clips conventionally used with backpacks
8 and webbing straps, and any connector to secure the
9 child to the arm can be used.

10
11 Figs 11 to 14 show details of possible connections
12 between nodes 54 and spine members 60. Fig 11 is an
13 exploded view showing spine members 60, the ends of
14 which terminate in rods that can slide into vertical
15 slots 72 in nodes 54 and are secured therein by
16 bolts 74 or pins. Bolts 74 fit through a first
17 aperture 76 in one side of ring 56, a corresponding
18 aperture 70 in the end of each spine member 60 and
19 through a second aperture 76 in ring 56. Fig 12 is
20 a non-exploded view of Fig 11.

21
22 Fig 13 shows an alternative connection between nodes
23 54 and spine members 60. Ring 54 has two end lobes
24 80, which each have a cylindrical lateral protrusion
25 82 in one side. The protrusions 82 are shaped to
26 engage sockets 84 in the ends of spine members 60.
27 Securing caps 86 attach to the protrusions 82 once
28 they are engaged in sockets 84. The caps 86 are
29 typically screwed to the protrusions by engaging
30 interior screw threads of the cap 86 with exterior
31 screw threads on the protrusion 82, but other

1 engagement means could also be used. Fig 14 is a
2 non-exploded view of Fig 13.

3
4 To secure a child to the restraining apparatus 10,
5 the child 12 puts on a harness 36 and fastens the
6 belt buckle 42. One of the sockets 44 of the
7 harness 36 is then connected to an arm 24 of the
8 apparatus 10. This is done by simultaneously
9 pushing socket buttons 95, 97. This compresses the
10 spring 93 and pivots the plates 92, 94 so the ends
11 of the plates 92, 94 at the socket opening move away
12 from each other. This widens the socket entrance
13 enough to allow the elongate tab 65 to be inserted.
14 Once the tab 65 is aligned with the apertures in the
15 plates 92, 94, the buttons 95, 97 are released,
16 which moves the plate ends over the tab 65, leaving
17 the ends of the tab 65 projecting through the
18 apertures in the plates 92, 94. Thus, the elongate
19 tab 65 is trapped in the socket 44 and the child 12
20 is secured to apparatus 10. The procedure is
21 repeated to secure all the children required to
22 respective arms of the apparatus 10.

23
24 To disengage a child 12 from the apparatus 10, the
25 socket buttons 95, 97, are simultaneously compressed
26 and held down. This compresses spring 93, and
27 pivots the plates 92, 94 to widen the socket opening
28 as before. This releases the tab 65 from the
29 apertures in the plates 92, 94 and the arm 62 is
30 then pulled out of the socket 44. The buttons 95,
31 97 are now released and the child takes off the

1 harness 36. This procedure is repeated to release
2 all children 12 from the apparatus 10.

3

4 Modifications and improvements can be incorporated
5 without departing from the scope of the invention.
6 For example, the position of the tabs and sockets
7 could be reversed, i.e. each arm could have a socket
8 and the harness could have a tab to engage the
9 socket.

10

11 The arm and socket do not have to engage by
12 apertures in plates engaging the arms; any way of
13 attaching the arm to the socket would be adequate,
14 e.g. the arm could screw into the socket.

15

16 The socket could be replaced by a lock mechanism,
17 requiring a special tool to release the arm, so that
18 a child secured to the apparatus could not release
19 itself.

20

21 Two sets of apparatus could be used parallel to each
22 other, with a central column of children attached to
23 both apparatus. Figure 15 shows a number of
24 different schematic combinations of children 12,
25 spines 100 and arms 110. Not all of the nodes need
26 to be provided with arms at each side, nor do all
27 the nodes or arms need to be occupied by children.

28

29 Embodiments of the invention could be created using
30 a single spine instead of separate spine members
31 (thereby removing the need for nodes) where the arms
32 extend out through apertures in the spine. The

- 1 harnesses could be permanently attached to the
- 2 apparatus (instead of releasably attached by the arm
- 3 and socket connection).
- 4

1 Claims

2

3 1 Restraining apparatus for coupling two or more
4 users comprising at least one spine member with at
5 least two lateral attachment members for coupling
6 the users to the spine member, the spine member
7 having two planes, and having more flexibility in
8 one plane than in the other.

9

10 2 Apparatus as claimed in claim 1, where the
11 spine member is an elongate rod or plate from which
12 the lateral attachment members extend sideways.

13

14 3 Apparatus as claimed in claim 1 or claim 2,
15 wherein the spine member is inextensible along its
16 long axis.

17

18 4 Apparatus as claimed in any preceding claim,
19 wherein the spine member is rigid in its vertical
20 plane but has a degree of lateral resilience.

21

22 5 Apparatus as claimed in any preceding claim,
23 wherein the spine member is at least partially
24 formed from a material selected from the group
25 comprising plastics material, composite material,
26 and resilient materials.

27

28 6 Apparatus as claimed in any preceding claim,
29 wherein the spine comprises a stiffening member to
30 enhance rigidity in one plane.

31

1 7 Apparatus as claimed in claim 6, wherein the
2 stiffening member is at least partially formed from
3 a material selected from the group consisting of
4 plastics, metals and composite materials.

5

6 8 Apparatus as claimed in any preceding claim,
7 wherein the attachment members are releasably
8 secured to the spine member.

9

10 9 Apparatus as claimed in claim 8, wherein the
11 attachment members comprise elongate arms extending
12 laterally from the spine member.

13

14 10 Apparatus as claimed in claim 9, wherein the
15 arms are flexible and/or axially extensible and/or
16 compressible.

17

18 11 Apparatus as claimed in claim 10, wherein the
19 arms are pivotable with respect to the spine member.

20

21 12 Apparatus as claimed in claim 11, wherein two
22 or more arms are provided and at least two of the
23 arms are pivotable with respect to each other.

24

25 13 Apparatus as claimed in any one of claims 8-
26 12, wherein respective attachment members extend
27 from different sides of the spine member.

28

29 14 Apparatus as claimed in any one of claims 8-
30 12, wherein attachment members are staggered along
31 the spine member.

32

1 15 Apparatus as claimed in any preceding claim,
2 including harnesses worn by each user and wherein
3 the attachment members are adapted to attach to the
4 harnesses.

5

6 16 Apparatus as claimed in claim 15, wherein the
7 attachment members are adapted to attach releasably
8 to the harnesses.

9

10 17 Apparatus as claimed in any preceding claim,
11 incorporating luminous, reflective and/or light
12 emitting devices.

13

14 18 A method of securing or restraining a person,
15 comprising harnessing the person to a spine member
16 via an attachment member, the spine member having at
17 least two planes, and having a different degree of
18 flexibility in respective planes.

19

20 19 A method as claimed in claim 18, wherein more
21 than one person is harnessed to the spine member.

22

23

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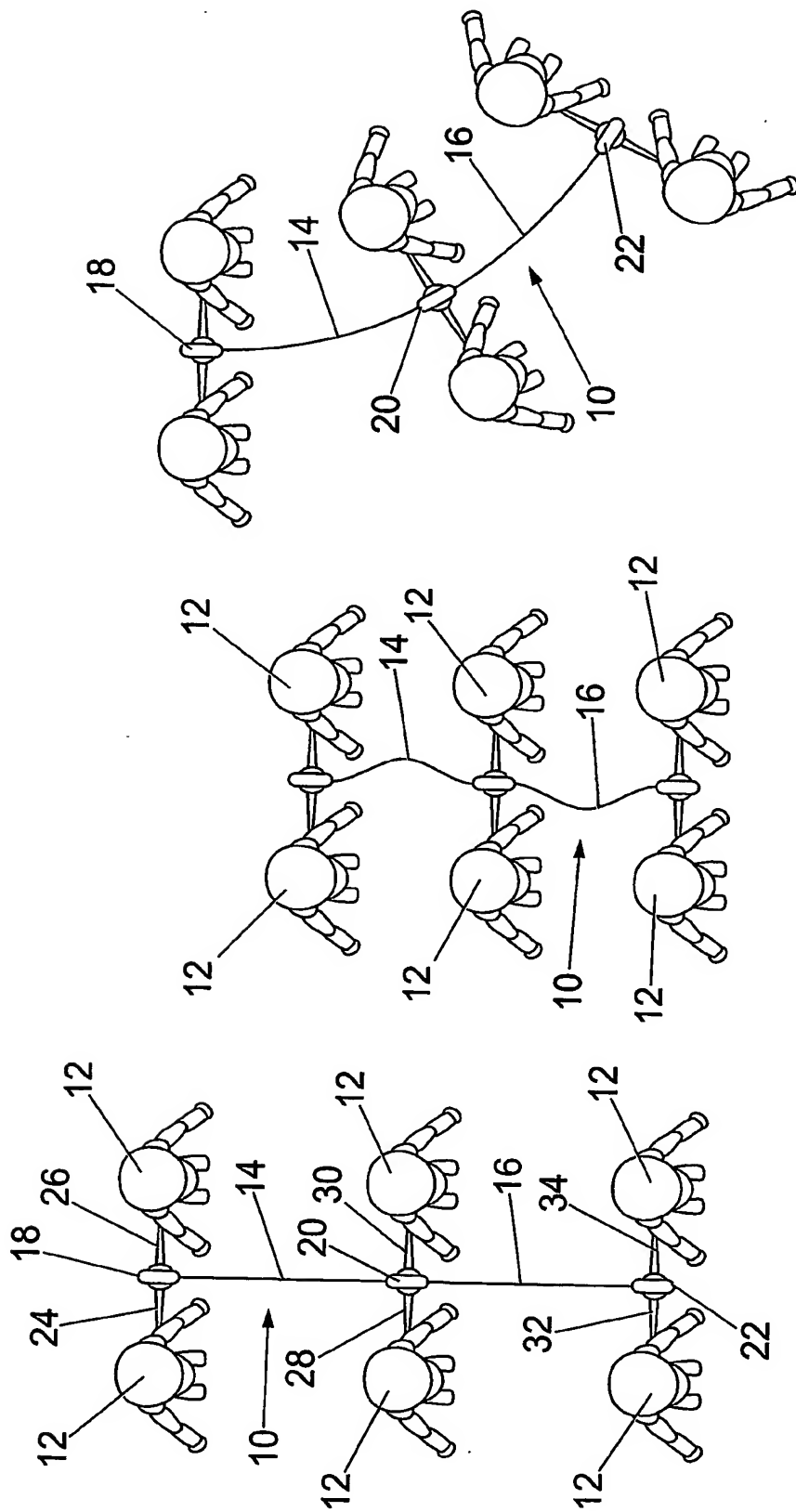


Fig. 3

Fig. 2

Fig. 1

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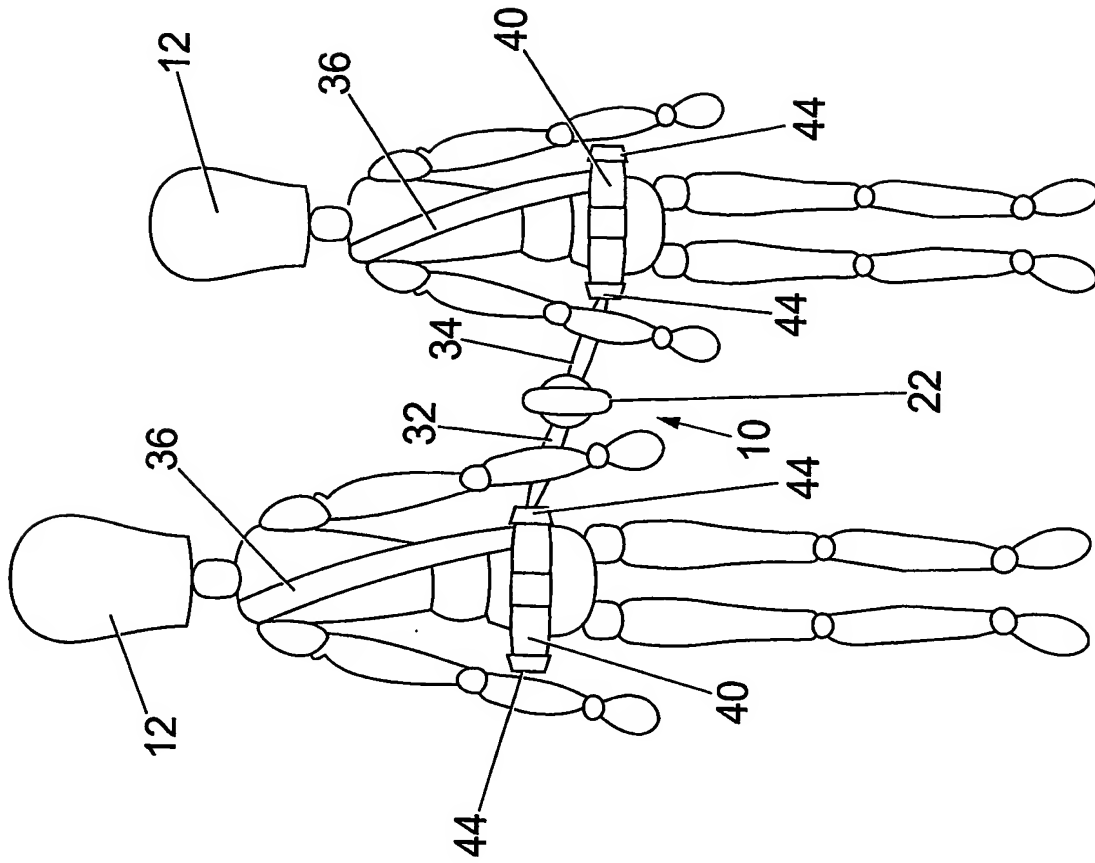


Fig. 5

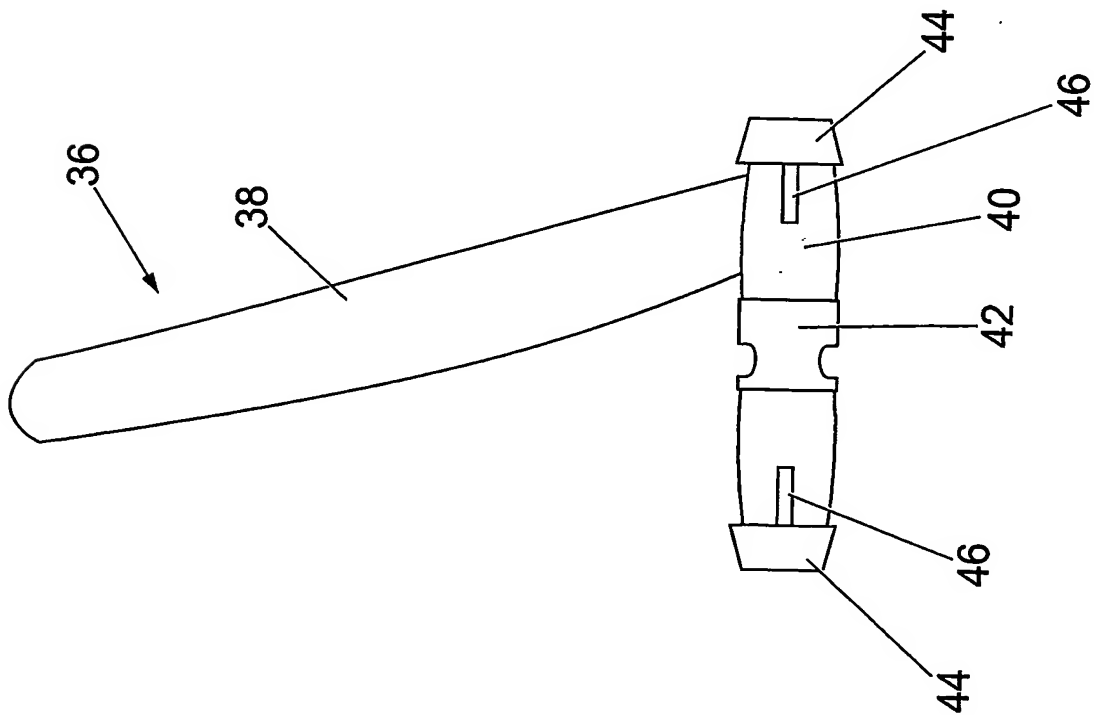


Fig. 4

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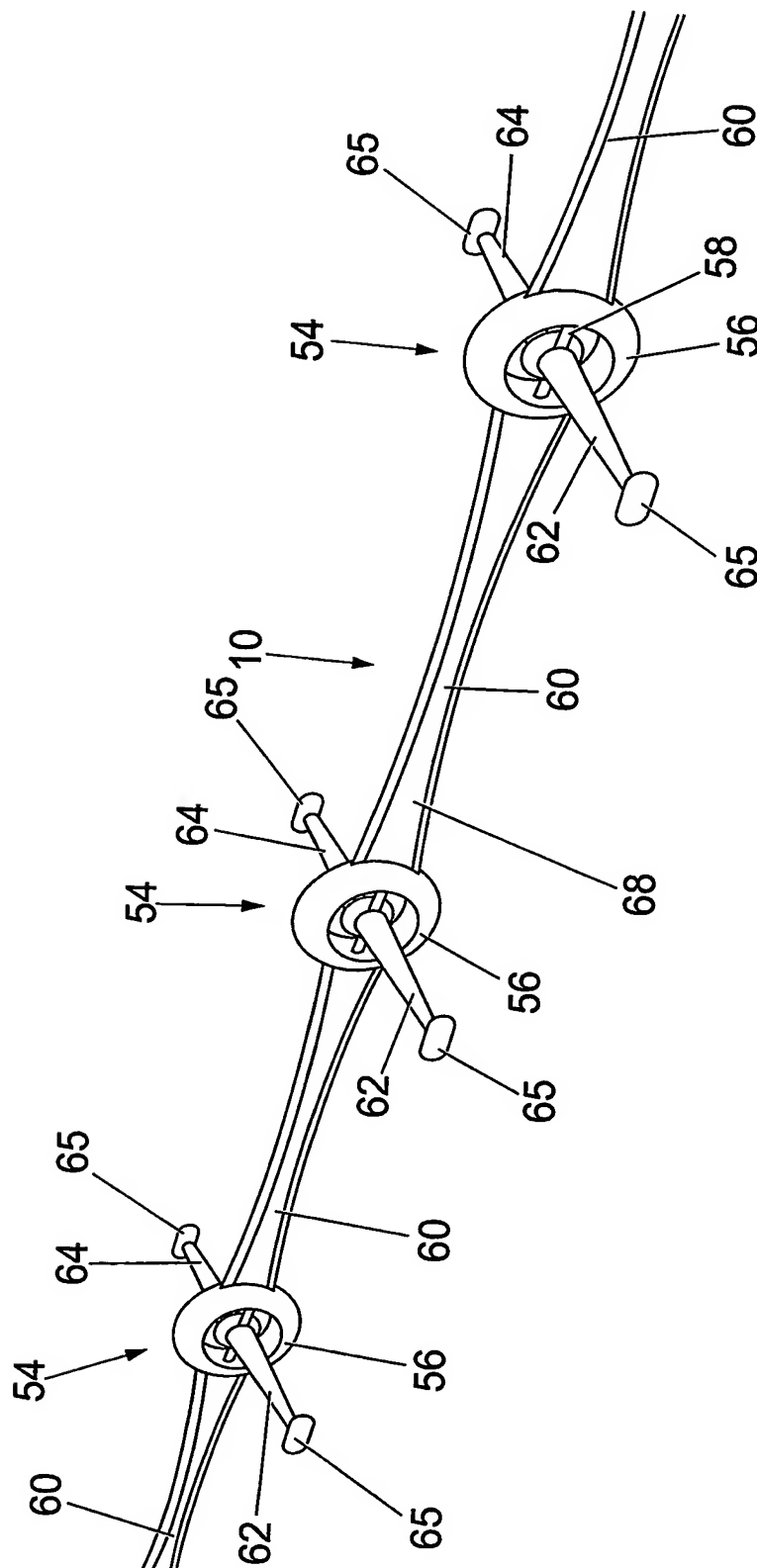


Fig. 6

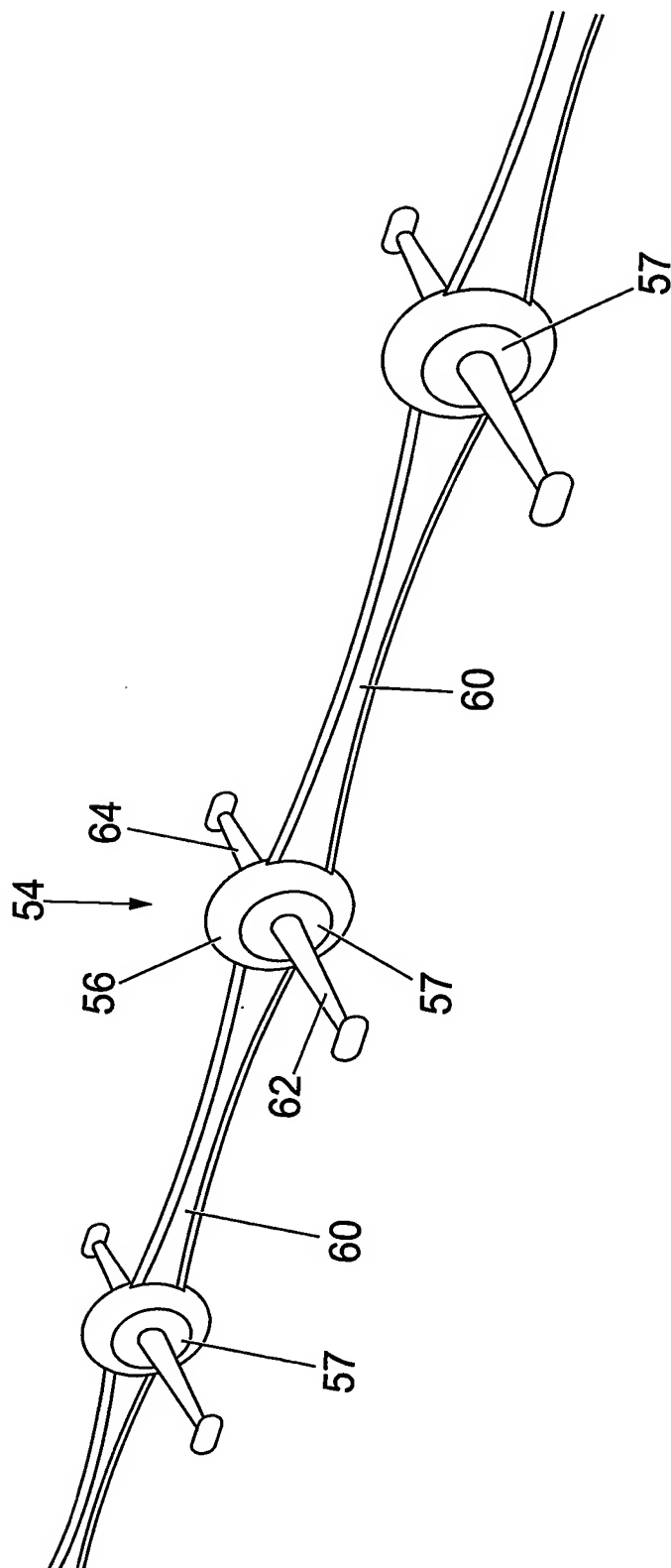
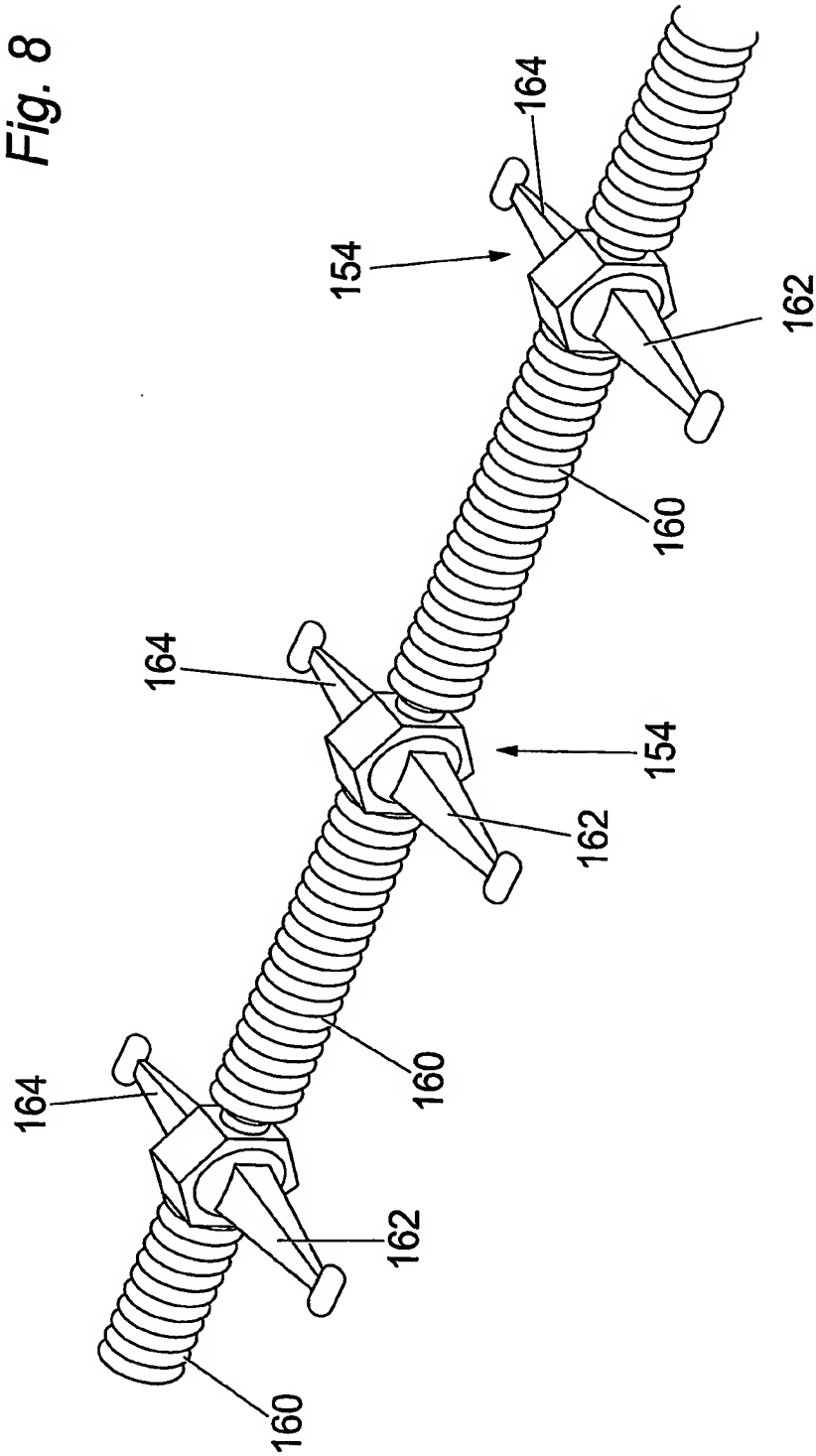


Fig. 7

Fig. 8



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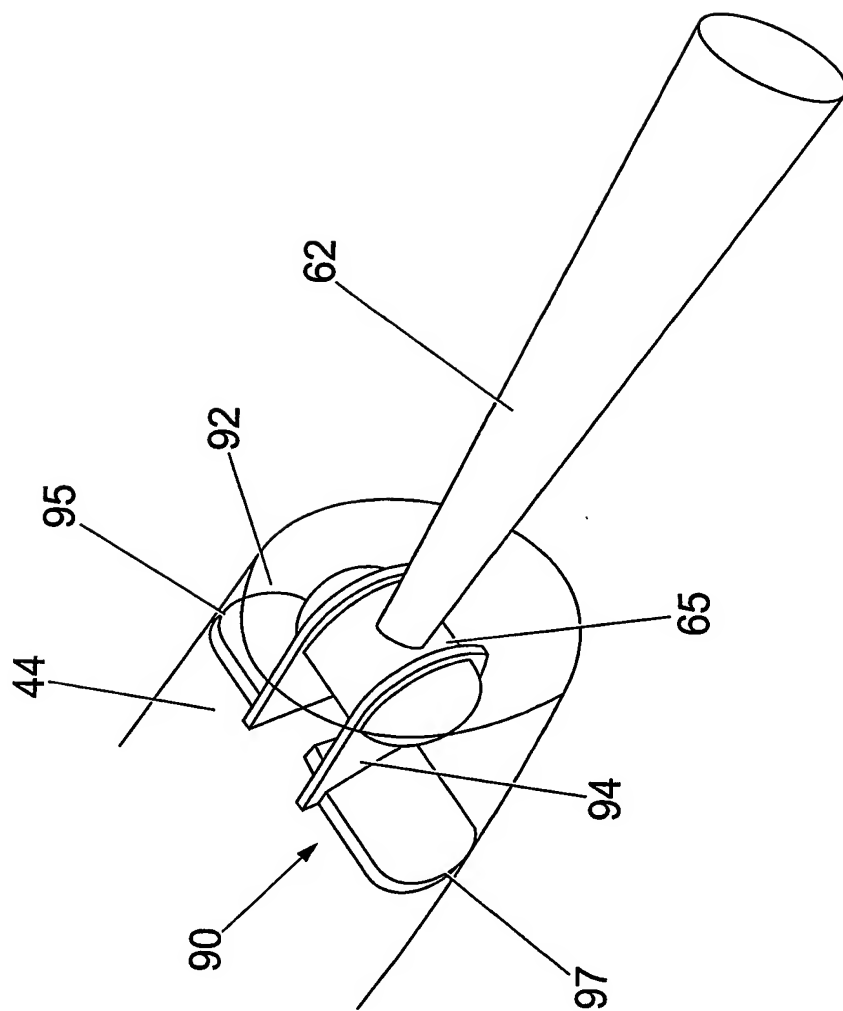
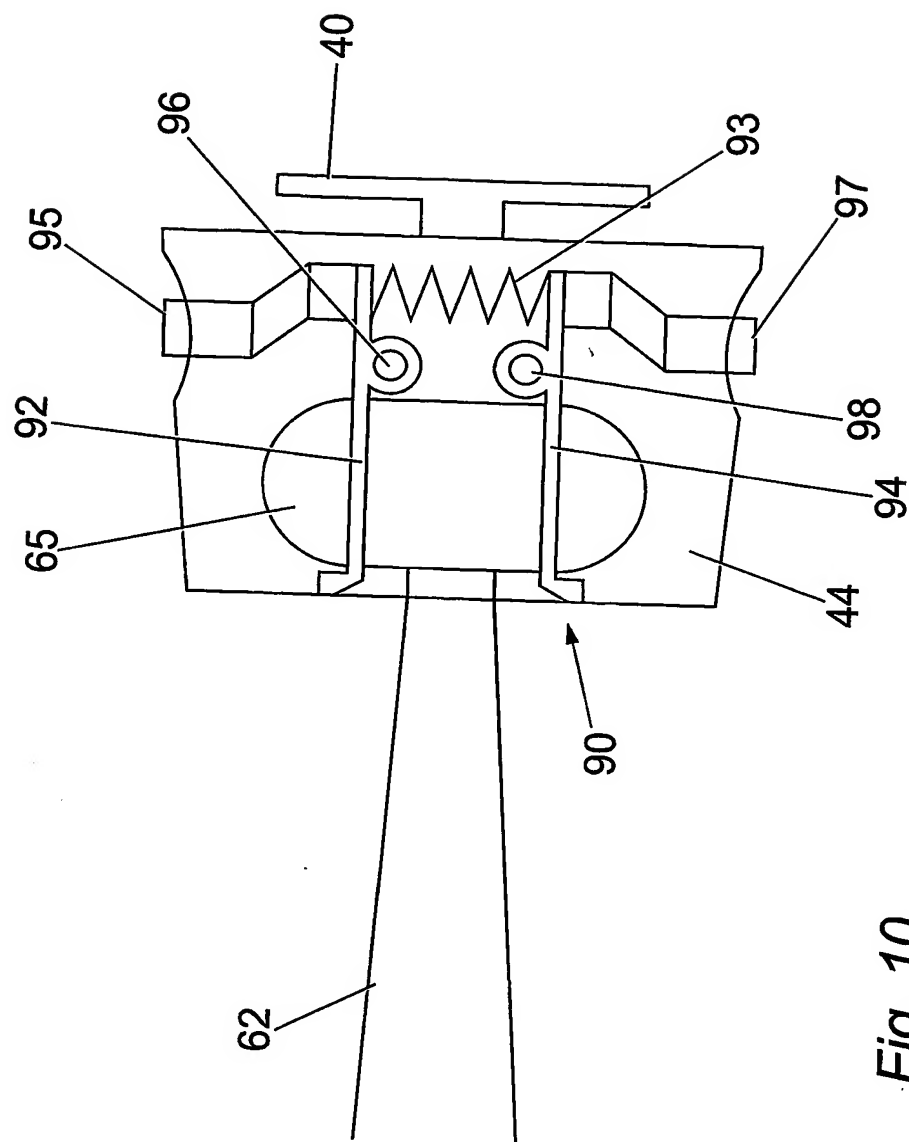


Fig. 9



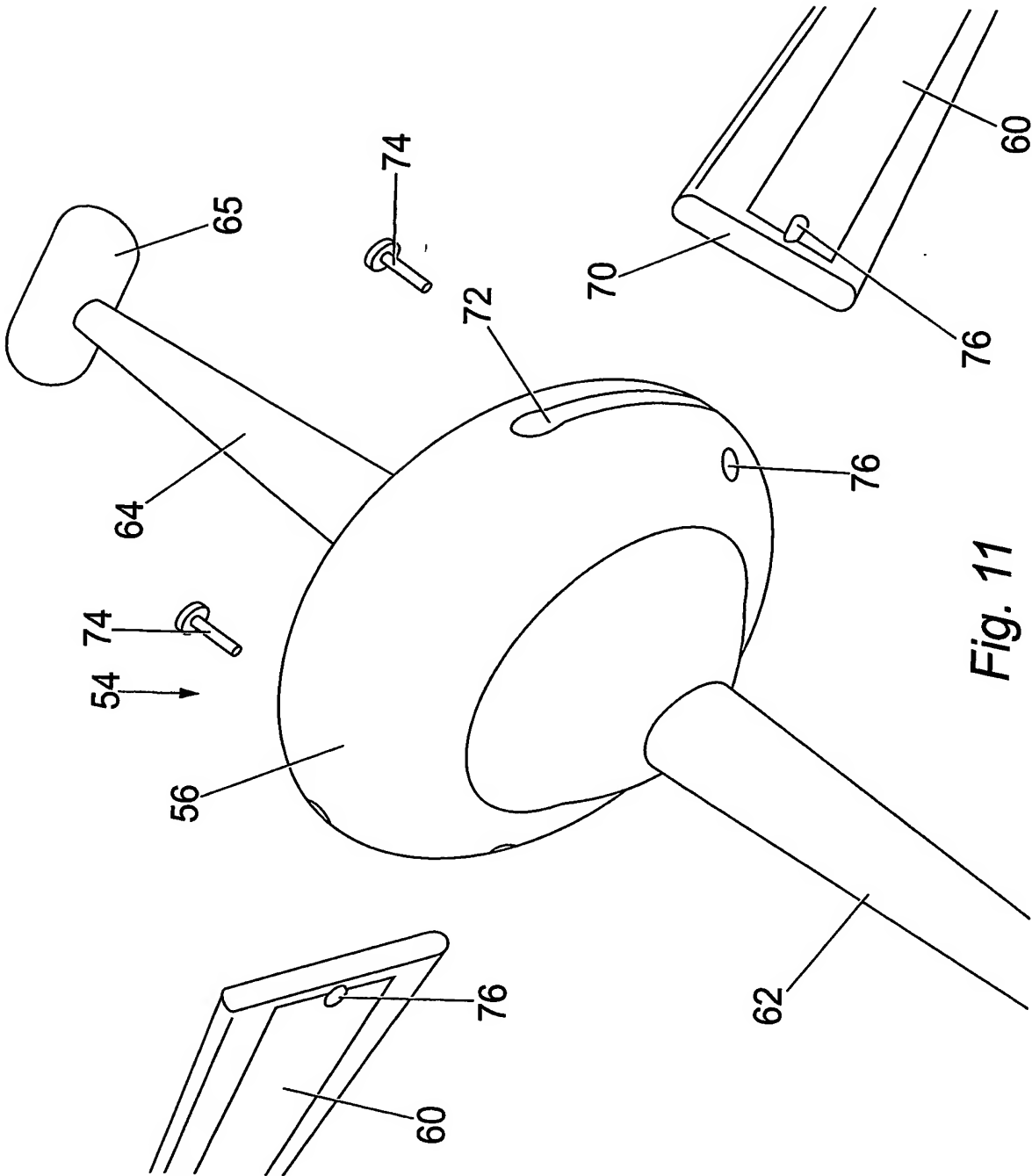


Fig. 11

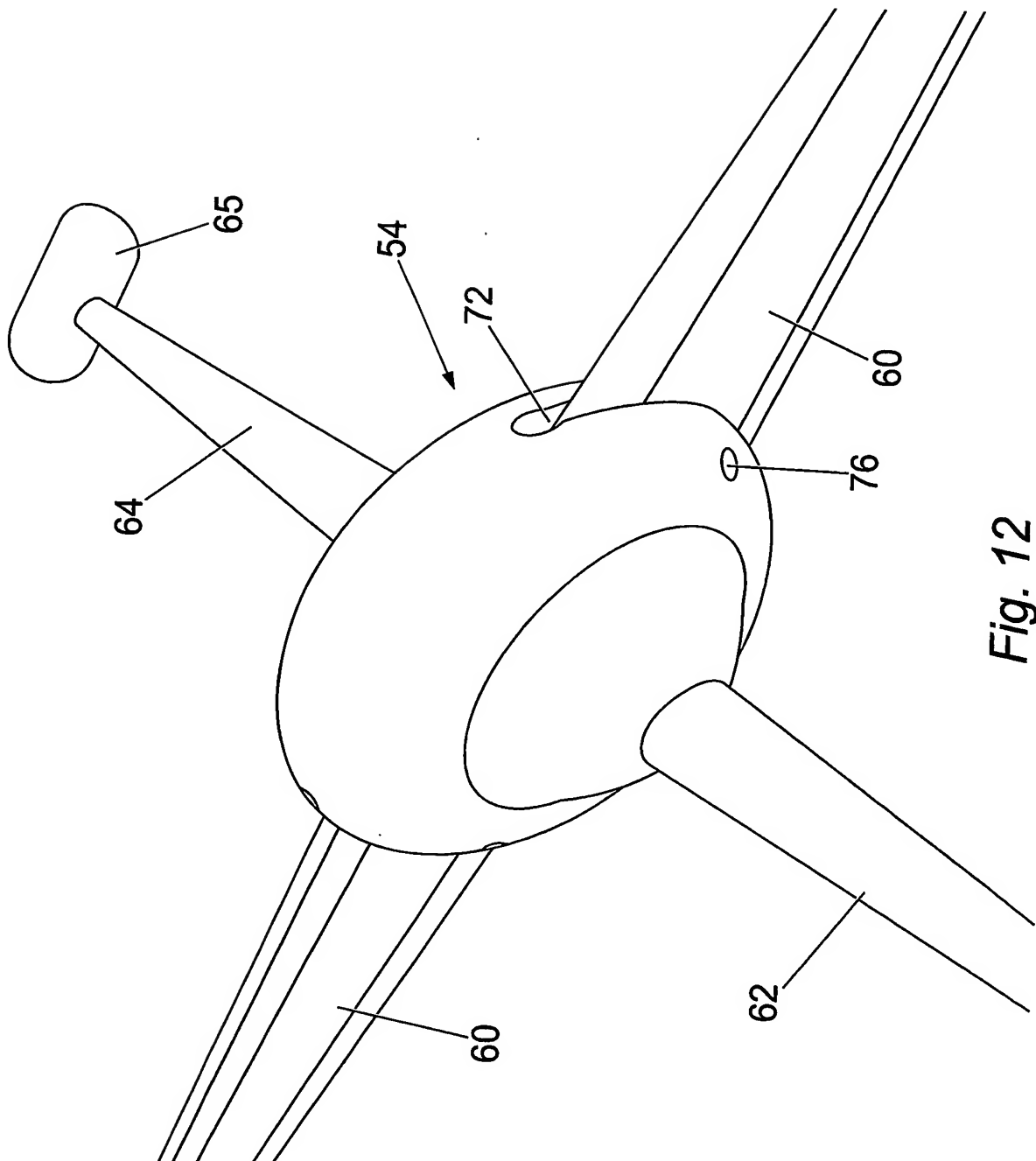
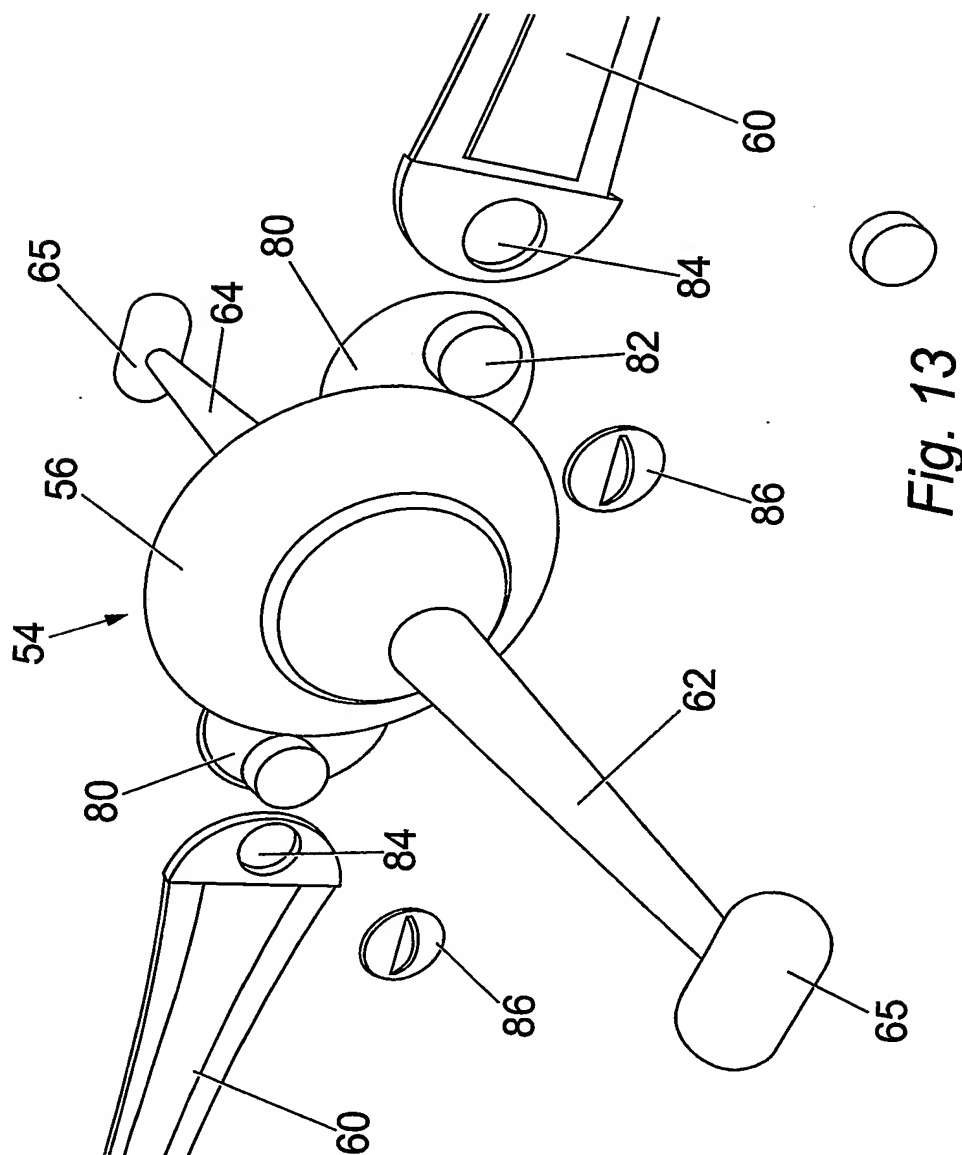
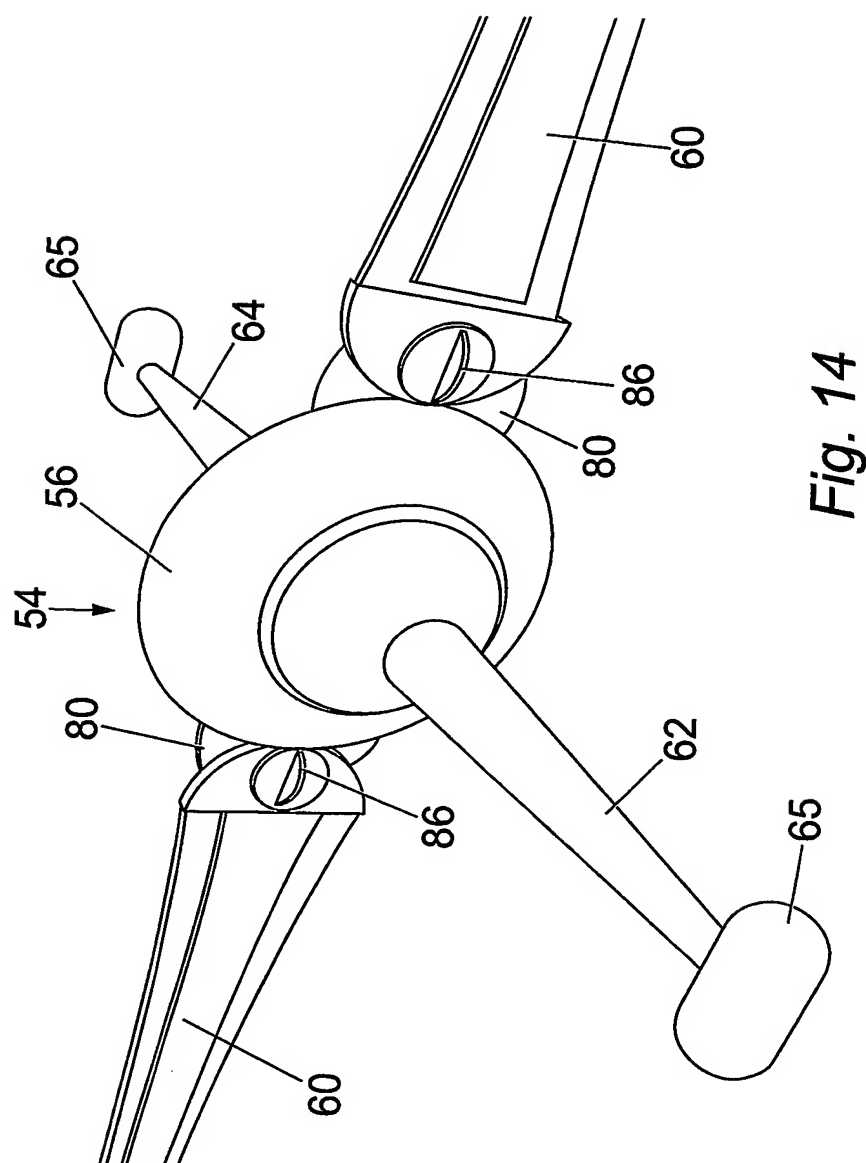


Fig. 12

10 / 12



11 / 12



12 / 12

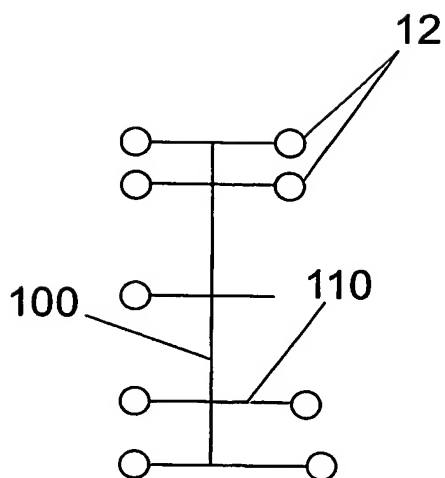


Fig. 15a

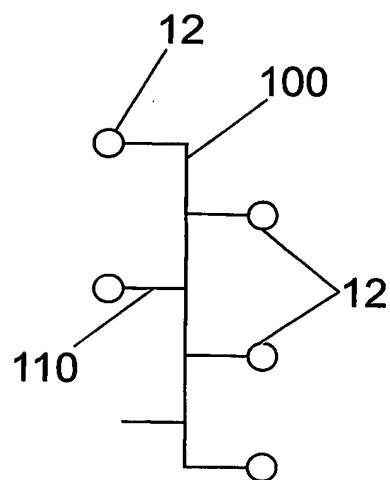


Fig. 15b

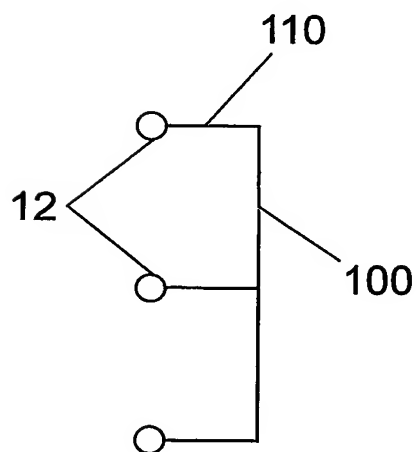


Fig. 15c

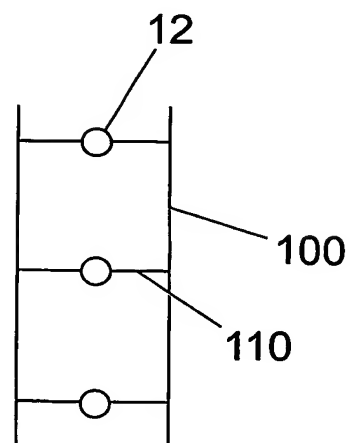


Fig. 15d

INTERNATIONAL SEARCH REPORT

PCT/GB 03/04159

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47D13/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47D F16G A63G A01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 423 292 A (HALL DANIEL J) 13 June 1995 (1995-06-13) claim 1; figures 1,5	1,3,5, 8-10,12, 13,18,19
A	US 3 563 208 A (NERO REGINALD A) 16 February 1971 (1971-02-16) figure 2	1,18
A	US 6 435 931 B1 (RYER ROY ROBERT ET AL) 20 August 2002 (2002-08-20) column 4, line 34 - line 36; figure 1	1-5,17
A	WO 97 25858 A (JACOBSEN CHRIS J) 24 July 1997 (1997-07-24) figure 9	1,18

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

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